SECTION _____ - GENERAL CONCRETE REQUIREMENTS

_____ COMPOSITION

a. General. - Concrete shall be composed of [1](cement,) [2](cementitious materials,) sand, coarse aggregate, water, and admixtures as specified, all well mixed and brought to the proper consistency.

b. Nominal maximum size of aggregate. - The coarse aggregate to be used in concrete shall be as large as practicable, consistent with required strength, spacing of reinforcement and embedded items, and placement thickness. The size of coarse aggregate to be used will be determined by the Contracting Officer, and may vary incrementally according to the conditions encountered in each concrete placement. [3][(If the aggregate source chosen by the Contractor has a shortage of the 3-inch, nominal, maximum-size aggregate,) the Government will consider a request to use smaller nominal maximum-size aggregate in portions of the work. If such a change is granted, it shall be at no additional cost to the Government, and the Contractor will not be reimbursed for additional [1](cement) [2](cementitious materials) required as a result of using a smaller size aggregate.]

Generally [4](3-inch, nominal, maximum-size aggregate shall be used in concrete walls greater than 15 inches in thickness and in concrete slabs greater than 9 inches in thickness, and) 1-1/2-inch, nominal, maximum-size aggregate shall be used in [4](other) concrete placements. [4](Nominal maximum-size aggregate for concrete canal lining shall be 11/2 inches for lining thickness 3 inches and greater and 3/4 inch for thickness less than 3 inches.) Smaller coarse aggregate than indicated above shall be used where the Contracting Officer determines that proper placement of concrete is impractical [4](with the above-listed aggregate sizes).

c. Mix proportions. - The mix will be designed and adjusted by the Government. The proportions of ingredients will be established in accordance with the Eighth Edition - Revised Reprint of the Bureau of Reclamation Concrete Manual. The proportions will be adjusted during the progress of the work whenever need for such adjustment is indicated by results of testing of the aggregates and the concrete. Adjustments shall be made as directed to obtain concrete having suitable workability, impermeability, density, strength, and durability without the use of excessive [1](cement) [2](cementitious materials). Suitable strength for structural concrete is that which will assure that [5](90) percent of all test cylinders exceed the design strength. Suitable strength for tunnel lining, canal lining, and all other concrete is that which will assure that 80 percent of all test cylinders exceed the design strength. Unless shown otherwise on the drawings, the design strength at 28 days shall be [5](_____ pounds per square inch for structural concrete, _____ pounds per square inch for canal and tunnel lining, and _____ pounds per square inch for lean backfill concrete).

The net water- [1](cement) [2](cementitious materials) ratio, exclusive of water absorbed by the aggregates, shall be sufficiently low to provide adequate durability in concrete. Table 15, page 135, Eighth Edition - Revised Reprint of the Bureau of Reclamation Concrete Manual

will be used as a guide for determining the maximum water- [1](cement) [2](cementitious materials) ratio to ensure durability of concrete.

Where portland cement plus a pozzolan is used as specified in subparagraph [6][_____ b.(2)], [7][_____ b.(2) and (3),] [8][_____ b.(1) and (2)] below, the pozzolan shall constitute 20 percent, by weight, of the total cementitious materials.

d. Consistency. - The slump of the concrete at the placement [9][shall not exceed [4](2 inches plus or minus 1 inch for concrete in the tops of walls, bridge piers and abutments, parapets, and curbs; in slabs that are horizontal or nearly horizontal; and in all tunnel inverts placed as slabs with unformed top surface; shall not exceed 4 inches plus or minus 1 inch for concrete in sidewalls and arch of tunnel lining and in tunnel inverts placed monolithically with the sidewalls and arch; and shall not exceed 3 inches plus or minus 1 inch for concrete in canal lining and for all other concrete.)] If the specified slump is exceeded at the placement, the concrete is unacceptable. The Government reserves the right to require a lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of the vibration specified in subparagraph _____ c. (Placing).

The use of buckets, chutes, hoppers, pumps, transit mix trucks, or other equipment which will not readily handle and place concrete of the specified slump will not be permitted.

When type F or G chemical admixture is used to fluidize the concrete for an unusual placing condition, the slump shall be appropriate for the placing conditions. For assistance locating a supplier, the contractor may contact the Bureau of Reclamation Materials Engineering and Research Group.

Uniformity in concrete consistency from batch to batch will be required. To maintain concrete at the proper consistency, the amount of water and aggregates batched for concrete shall be adjusted to compensate for variations in the moisture content or grading of the aggregates as they enter the mixer. Addition of water in excess of the design water content to compensate for stiffening of the concrete after mixing, known as retempering, will not be permitted.

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[1]Delete when Concrete standard, Conc. 3 Cementitious Materials, is used.
[2]Delete when Concrete standard, Conc. 2 Cement, is used.
[3]Revise as necessary. Delete reference to 3-inch aggregate if not applicable.
[4]Revise or delete as required.
[5]Revise as necessary. Consult with designers.
[6]Include when Conc. 3A or Conc. 3B is used.
[7]Include when Conc. 3C is used.
[8]Include when Conc. 3D is used.
[9]If the work involves primarily substation and transmission line footings, delete the remainder of this sentence and insert "shall not exceed 3 inches".

3-15-85 Revisions: Revised subparagraph c. Other minor revisions.